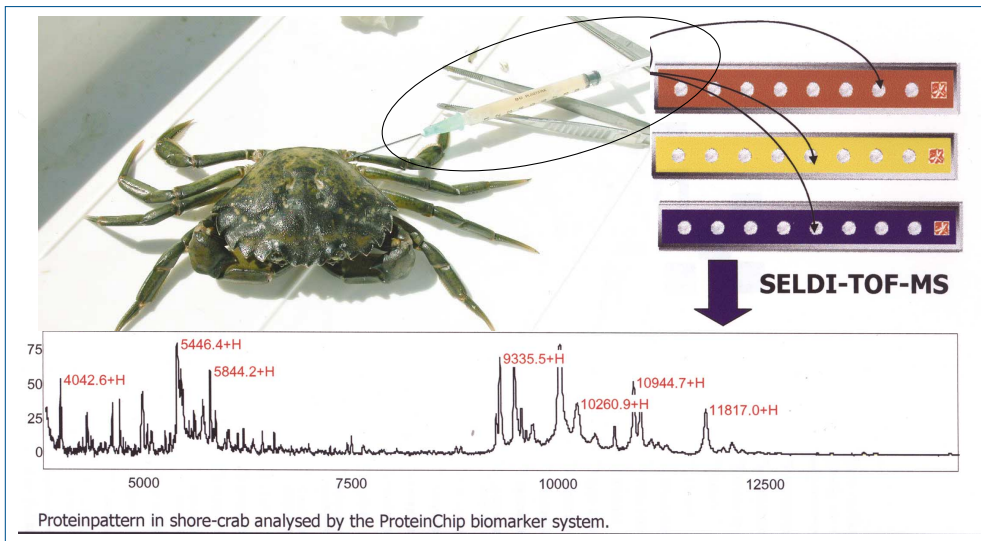


RF - Akvamiljø

RF-Akvamiljø is a Centre for environmental research in aquatic environment. The three affiliated companies: RF-Rogaland Research, Akvamiljø a/s and Akvamiljø Caspian AS with 45 scientists and engineers provide advanced research and services within ecotoxicology, environmental risk assessment, monitoring, field- and laboratory experiments and analyses. Akvamiljø Caspian performs environmental consultancy & research in the Caspian region and operates a laboratory - in Baku, Azerbaijan - according to GLP standards.

Proteomics – the study of proteins



For years, scientists have been racing to map the genes. The next challenge is to study the building blocks produced by DNA; the 100-thousands of proteins that make up every muscle, nerve and fibre in an organism. The enzymes that digest our food and regulate our moods are proteins, as are germ-killing antibodies and the haemoglobin that carries oxygen. Given that proteins are vital to any organisms functioning, they naturally are of interest to anyone who cares about life.

The field of proteomics is experiencing a rapid growth and development all over the world. To be part of this, RF-Akvamiljø has (as the first group in Norway) invested in a ProteinChip

Biomarker System from CIPHERGEN Biosystems A/S. This system is a powerful tool in proteomics, extensively used in clinical research areas such as cancer, HIV/AIDS, neurological diseases and cardiovascular disorders to find single proteins or protein patterns that signal for example disease susceptibility or disease states.

RF-Akvamiljø wants to apply the same technology in environmental research. This strategy will give new opportunities for fingerprinting protein changes in an organism due to specific exposure situations. Changes in single proteins or protein patterns will provide evidence of exposure to or effect of any condition and thereby be useful inputs in environmental monitoring and risk assessment.



An overall objective for us is to establish a strong and creative network between research institutions and industry that work with proteins (medical, veterinary, environmental research, food/feed control, biological process control etc.) both locally, nationally and internationally. Prof. Brian Bradley from university of Maryland (US) is part of our international network. In August he visited RF-Akvamiljø to give a seminar on the future of proteomics in environmental research.

ProteinChip System- how does it work:

The process begins with the chips, thin strips of aluminium coated with chemicals designed to grab and hold certain types of proteins. Then find the tissue/fluid you want to study, deposit a few drops on the chip, which then is inserted into a ProteinChip reader. This reader is a sophisticated mass spectrometer.

Contact persons: O. K. Andersen & A. Bjørnstad
Phone +47 51 87 50 50 Odd-Ketil.Andersen@rf.no
Phone +47 51 87 55 26 Anne.Bjornstad@rf.no

Environmental and socio-economic impacts of shrimp farming in Bangladesh



A typical pond system for production of brackish water shrimp in Bangladesh (Photo: Bjørn Braaten, NIVA).

This NORAD supported project has been running for a 6-year period (1997-2002) and has just been terminated. The three main institutions involved were Bangladesh Agricultural University (BAU), Norwegian Inst. for Water Research (NIVA) and RF- Rogaland Research.

Shrimp industry in Bangladesh

About 30,000 tons of brackish water shrimp are annually produced in Bangladesh in ponds that totally occupy about 150,000 ha of the coastal zone. The production is an extensive form with a yearly harvest of 70 – 200 kg per ha. The industry in Bangladesh suffers from high mortality - 80 – 90% - because of outbreaks of the White spot disease

The increase in shrimp culture in Bangladesh has not only increased the ecological problems, but has also led to a growing number of social problems. Nevertheless, the shrimp industry represents about 8% of Bangladesh's total export income and more than 600,000 people are involved.

Water quality: The water quality was extensively monitored throughout the production cycle at several sites and showed no critical conditions but suboptimal conditions were frequently detected. The ponds are also often acting as sinks for solids and nutrients from river waters leading to the ponds.

Denudation of mangrove forest: Based on remote sensing and GIS the loss of mangrove forests due to shrimp farming was mapped by Bangladesh Space Research and Remote Sensing Org. (SPARRSO). Since 1975, nearly 10,000 ha, or less than 2% of the total mangrove forest coverage of the country, was found denuded and converted into shrimp ponds.

Socio-economic impacts: By providing income and employment opportunities and accelerating many activities, coastal communities including women had chances to improve their socio-economic condition through their direct or indirect involvement in coastal aquaculture. The study revealed that the existing unplanned shrimp culture has affected the production of cereal crops and vegetables, trees and plantation, poultry and livestock in shrimp growing areas.

Shrimp farming has also negative effects on coastal environment and agro-ecosystems, which have moderately changed the biodiversity in the study areas. However, due to social intervention physical and social environments in the coastal areas have been gradually improving.

Contact person: Asbjørn Bergheim
Phone +47 51 87 5331 Asbjorn.Bergheim@rf.no

Monitoring the local marine sewage recipients

The fjords surrounding the city of Stavanger and its peninsula have been investigated and the effects of municipal sewage brought into focus since 1964. In 1992 a major sewage treatment plant opened which was designed to treat sewage according to 250 000 (person equivalents, PE). Today approx 90 % of the population (160 000 PE) is connected to the plant.

RF-Akvamiljø is conducting a large environmental monitoring survey which aims at measuring the effects of the effluent in Håsteinsfjorden and the adjacent recipients.

The 2002 investigation is a follow-up to a similar survey performed in 1995. The field work included a lot of surface water samples from the whole area which were analysed for nutrition content and algae biomass (chlorophyll). Moreover, bottom water oxygen levels and hydrography were measured. Algae and fauna in the littoral zone were recorded at some stations in summer, and the richness of species in the communities may be linked to environmental conditions. Soft bottoms at deeper waters were sampled and analysed for benthic animals, organic content, organic pollution (PAHs and PCBs) and metals. The results from the investigation will be reported in 2003.



Contact person: Øyvind Tvedten
Phone+47 51 87 54 36 Oyvind.Tvedten@rf.no

Environmental baseline offshore surveys

In May 2002 RF-Akvamiljø together with RF-Environmental Laboratory conducted a baseline survey on five petroleum fields of the second and third region in the North Sea. Sediment samples were taken from the seabed with a grab to investigate the environmental conditions.

The surveys have been required by The Norwegian Pollution Control Authority (SFT) and are part of the documentation of the environmental conditions prior to oil and gas production. Water depth in these areas varied from 85 to 370 meter, and the seabed consisted of clay and silt at the deepest area and fine grained sand at the shallowest.

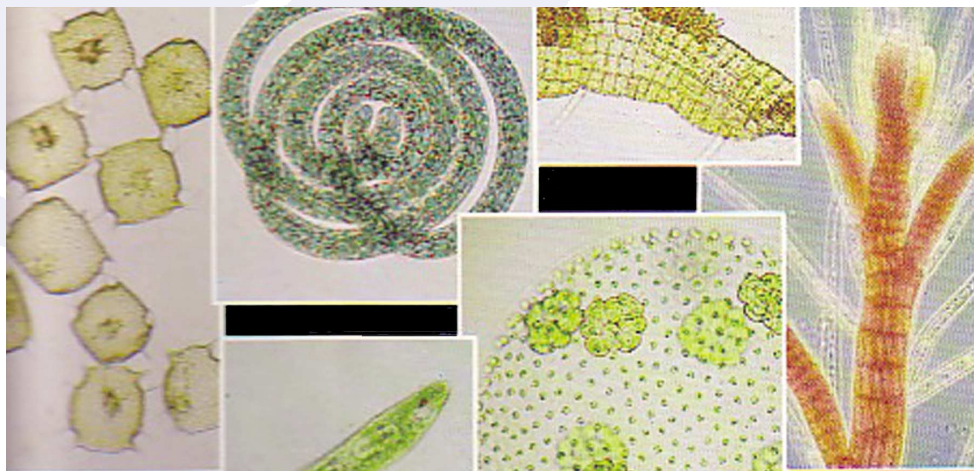


A total of 68 stations were sampled from the five different fields. 240 sub samples for chemical (THC, PAH and metals) and physical analyses (grain size) were collected together with 355 fauna samples. Results will be reported in spring 2003.

Contact Person: Veslemøy Eriksen
Phone +47 51 87 51 10. Veslemoy.Eriksen@rf.no



CO₂ and micro-algae



RF has been working with alternative use of CO₂ through two projects. One project was required by "ARNE", a common business development initiative taken by several communes in Rogaland. The other project was for Shell Technology Norway. The "ARNE" project aimed at looking into the economical and technical possibilities of producing w-3 fatty-acids with micro-algae under northern latitudes. challenges before this possibility is commercially viable in Norway. The "ARNE" project was performed in collaboration with Polytec. The second project was to look into the major

alternatives for sequestering CO₂. Challenges related to the use of CO₂ in general and emphasis on utilisation of CO₂ from a Solid Oxidative Fuel Cells (SOFC) was made. Sequestration of large CO₂ volumes in geological formation, IOR, ocean sequestration and removal in terrestrial systems were described. A comparison between the different applications related to the amount coming from an SOFC was made.

Contact person: *Troels Jacobsen.*

Phone: + 47 51 87 53 19. *Troels.Jacobsen@rf.no*

RF-Akvamiljø active in new Norwegian Research Council program

"PROOF", the new research council program concerning long term effects of discharges to the sea from offshore activities, was started up in 2002. Pre-projects in prioritized areas were launched and thus RF- Akvamiljø commenced activities related to bioavailability of hydrocarbons in oil droplets, impacts of metals from drill cuttings and mud, contamination of North Sea fish, and methods for determination of PAH- and alkylphenol metabolites.

In addition the Council intends to finance two RF-Akvamiljø projects from 2003 - one regarding produced water exposure and effects in fish and another regarding links between the methodologies for biological effect

monitoring and risk assessment.

The Research Council has emphasized the importance of collaboration in this program, and the projects above include participation by SINTEF, Institute of Marine Research and NIVA. Foreign participants with special expertise in certain areas have also been brought in whenever it was found necessary in order to obtain well qualified results.

More information about these projects will follow in coming newsletters.

Contact person: *Steinar Sanni*

Phone: +47 51 87 55 04 *Steinar.Sanni@rf.no*



RF – Akvamiljø
Mekjarvik 12, N-4070 Randaberg, Norway
Phone: +47 51 87 55 00 Fax + 47 51 87 55 40
www.rf.no

